

CLAIMS

- 1 A light outputting device comprising:
 - a containment for housing an element for emitting light;
 - at least one axially extending light conducting element having an axial length substantially greater than its width transverse the axis; the light conducting element being aligned axially with the element for emitting light by means of the containment or an extension thereof; the, or each, light conducting element having a light input region such as an end face whereby light generated by the element for emitting light is caused to pass axially into the or each light conducting element by way of its associated light input region.
- 2 A light outputting device as claimed in Claim 1 wherein the containment or an extension thereof serves to locate the element for emitting light closer to the light input region of the, or each, light conducting element than to the major part of the containment remote from the light input region or regions.
- 3 A light outputting device as claimed in any preceding claim incorporating a reflector located relative to:
 - the element for emitting light and
 - the, or at least one, light conducting elementso as to reflect light from the element for emitting light axially into the, or at least one, light conducting element by way of its associated light input region.
- 4 A light outputting device as claimed in any preceding claim incorporating a refractor located relative to:
 - the element for emitting light and
 - the, or at least one, light conducting elementso as to refract light from the element for emitting light axially into the, or at least one, light conducting element by way of its associated light input region.
- 5 A light outputting device as claimed in any preceding claim wherein the containment is substantially opaque and light can only pass out of the containment from the element for emitting light by way of the, or at least one,

light conducting element.

- 6 A light outputting device as claimed in any preceding claim incorporating heat transfer means such as a heat sink in intimate contact with, or forming an integral part of, the containment whereby heat generated by the element for emitting light can be dissipated.
- 7 A light outputting device as claimed in any preceding claim incorporating heat transfer means such as a heat sink in intimate contact with, or forming an integral part of the, or at least one, light conducting element whereby heat generated by the element for emitting light can be dissipated.
- 8 A light outputting device as claimed in any preceding claim wherein the containment serves to define a plenum about the element for emitting light whereby a vacuum or an inert gas or a mixture of gases to be maintained by means of the plenum about the element for emitting light.
- 9 A light outputting device as claimed in any of preceding claims 1 to 7 wherein the element for emitting light is contained in an envelope within the containment and the envelope serves to define a plenum about the element for emitting light whereby a vacuum or an inert gas or a mixture of gases to be maintained by means of the envelope about the element for emitting light.
- 10 A light outputting device as claimed in any preceding claim incorporating means for varying the colour of light output by the device.
- 11 A light outputting device as claimed in any preceding claim wherein the element for emitting light comprises more than one light emitter so that the element for emitting light can be used to emit more than one light wavelength.
- 12 A light outputting device as claimed in any preceding claim wherein the containment serves to provide a location means for the device adapted for complementary engagement with an external device whereby the device can be demountably attached by means of the light conducting element or an

extension thereof to a further light conducting path in a predetermined position relative to some path datum.

- 13 A light outputting device as claimed in Claim 1 wherein the containment comprises a housing defining a passage in which the light conducting element is located, the passage having an inner end located within the containment serving as a wall of a chamber within the containment; the chamber serving to locate the element for emitting light.
- 14 A light outputting device as claimed in Claim 13 wherein the housing is opaque.
- 15 A light outputting device as claimed in Claim 13 or 14 wherein the chamber serves to house, or has a boundary region serving to define, means for reflecting or refracting light emitted by the element for emitting light axially into the, or at least one, light conducting element by way of its associated light input region.
- 16 A light outputting device as claimed in Claim 13, 14 or 15 wherein the containment incorporates integral fins or is in good thermal exchange contact with a member incorporating fins; the fins serving to radiate or otherwise dissipate heat generated by the element for emitting light and transferred to the fins by way of the containment.
- 17 A light outputting device as claimed in any of preceding Claims 13 to 16 wherein the containment includes a yet further passage whereby the chamber can be communicated with from outside the device to provide for varying the pressure in the chamber and/or for supplying the chamber with a gas or vapour.
- 18 A light outputting device as claimed in any of preceding claims 13 to 17 wherein the containment comprises two parts demountably coupled to one another so that on being uncoupled they serve to expose the interior of the chamber.

- 19 A light outputting device as claimed in Claim 18 wherein the two parts of the containment each provide or contain a path of electrically conducting material and when assembled the two paths are:
electrically insulated from one another and
coupled to the element for emitting light
to enable electrical power to be supplied to the element.
- 20 A light outputting device as claimed in any of preceding Claims 13 to 18 wherein the containment includes a further passage for a conducting means for supplying electrical power to the element for emitting light.
- 21 A light outputting device as claimed in Claim 20 wherein the further passage can extend axially along, or radially from, the device.
- 22 A light outputting device as hereinbefore described with reference to and as illustrated in Figure 1, or Figure 2, or Figure 3, or Figures 4 and 5, or Figure 6 or Figure 7 or Figure 9 or Figure 10 of the accompanying drawings.
- 23 A light outputting device as claimed in any preceding claim wherein the element for emitting light comprises one or more of the following: a resistive filament; an arc; a discharge device; a solid state emitter (PN junction), a coherent light source with means for light stimulation and amplification.
- 24 A light outputting device as claimed in any preceding claim wherein the, or each, light conducting element is of fused quartz or other glass like material.
- 25 A light outputting device as claimed in any preceding claim wherein the containment is of fused quartz or other glass like material.
- 26 A method of fabricating a light outputting device as claimed in preceding claims 1 to 25 characterised by the steps of:
providing the light conducting element in the form of a longitudinal member with end faces and an outer surface apart from the end faces;
locating around the light conducting element a sleeve member of

greater length than the light conducting element with a first end of the light conducting element at or near one end of the sleeve so as to leave a length of sleeve projecting beyond the opposite end of the light conducting element to the first end;

the opposite end of the light conducting element to the first end forming, at least in part, the light input region;

causing the sleeve member to be contiguously juxtaposed with the outer surface of the light conducting element;

locating the element for emitting light in the length of sleeve projecting beyond the opposite end;

deforming the length of sleeve so as to form together with the light input region of the light conducting element the containment for the element for emitting light; and

sealing the deformed length of tube to cause the containment to form a gas tight enclosure for the element for emitting light.

- 27 A method of fabricating a light outputting device as claimed in Claim 26 wherein the sleeve is of a similar material to the light conducting member and the step of causing the sleeve member to be contiguously juxtaposed with the outer surface of the light conducting element comprises a fusing operation.
- 28 A method of manufacturing a light outputting device as claimed in Claim 26 wherein the sleeve is of a translucent or opaque material having a thermal coefficient of expansion comparable with that of the light conducting member.
- 29 A method of manufacturing a light outputting device as claimed in Claim 26, 27 or 28 wherein the step of locating the element for emitting light in the length of sleeve projecting beyond the opposite end includes locating conductors for supplying energy to the element.
- 30 A method of manufacturing a light outputting device as claimed in Claim 26, 27, 28 or 29 wherein the step of locating the element for emitting light in the length of sleeve projecting beyond the opposite end includes locating a mirror element for reflecting light generated by the element for emitting light to

enable the mirror element to be enclosed with the element for emitting light in the containment prior to the deforming and sealing steps.

- 31 A method of manufacturing a light outputting device as claimed in any of preceding claims 26 to 30 wherein the step of locating the element for emitting light in the length of sleeve projecting beyond the opposite end includes locating a lens element for refracting light generated by the element for emitting light to enable the lens element to be enclosed with the element for emitting light in the containment prior to the deforming and sealing steps.
- 32 A method of manufacturing a light outputting device as hereinbefore described with reference to the accompanying drawings.
- 33 An array comprising at least two devices, as claimed in any of preceding claims 1 to 25 or fabricated by means of a method as claimed in Claims 27 to 32 and a light guide array linking the or at least one light conducting element to a light output location remote from at least one device.
- 34 An array as claimed in Claim 33 wherein at least one of the devices is coupled to a heat exchange means whereby heat generated by the or each device is dissipated such as by natural or forced convection utilising gas or liquid coolant.
- 35 An array as claimed in Claim 33 or 34 incorporating in the light guide array or the light output location means for varying the colour of light originating from at least one of the devices.
- 36 An array as claimed in Claim 35 wherein at least one of the devices is demountably attached to the array and a magazine of replacement devices is located for the demountably attached device to enable the demountably attached device to be readily removed and replaced by a replacement device from the magazine thereof.
- 37 An array comprising at least two devices according to Claims 1 to 25.

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